

ADDENDUM

1. Title:
METHOD AND APPARATUS FOR VERIFYING A MATCH BETWEEN CONTENTS
OF AN ENCLOSURE AND DATA PRINTED ON THE ENCLOSURE

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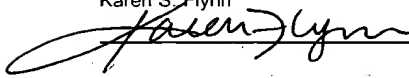
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Description

METHOD AND APPARATUS FOR VERIFYING A MATCH BETWEEN
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Technical Field

The present invention relates generally to information or data verification systems. More specifically, the present invention relates to the physical verification of matching associations between information or data contained on separate printed articles.

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Background Art

Mail inserting systems currently can insert a specific customer's materials into an envelope and then print the customer's address on the outside of the envelope. However, as is well known to persons skilled in the art, software errors as well as other errors do occur nonetheless, and in some cases the wrong customer's name, for instance, is printed on the envelope. Operators of processing equipment can of course tear a mail piece open to sample the process being implemented, but this action destroys the mail piece and does not catch errors in mail pieces not opened in this manner.

Prior to the present invention, it is believed that there was no known automated process by which to prove that a matching of information between

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the face of an enclosure and its contents were in fact correct. Moreover, there has not been an adequate means of catching the problem upon its occurrence and subsequently stopping the processing until the situation could be resolved. Accordingly, it will be appreciated by those skilled in the art that the ability to
5 provide such automated error detection and prevention would be a significant improvement over existing technology.

The present invention is provided to solve these and other problems associated with the prior technology.

Disclosure of the Invention

10 Broadly stated, the present invention provides an apparatus and method for physically verifying that the enclosed contents of a mail piece or other enclosure correctly match the printed address or other information on the mail piece. The present invention has particular application to closed faced addressing. The verification provided by the present invention is
15 advantageously implemented in mail inserting systems, but will be understood as not being limited to such systems.

According to one embodiment of the present invention, a method is provided for physically verifying a correct association between information printed on a closed face package and material and/or information contained
20 inside the closed face package. A closed face package is provided which includes a document inserted within the package. The package has a window permitting a portion of the document to be read from a location outside of the package. One or more reading devices such as optical scanners is provided. In a specific embodiment, a first reading device is employed to read data

printed on the package and a second reading device is employed to read document data, the document data having been printed on the inserted document and appearing through the window of the package. A data file is read to access account information stored therein corresponding to the document data. At least a portion of the accessed account information is compared with the package data to determine whether a matching association exists between the package data and the document data. If the matching association is determined to exist, the package is allowed to be further processed. If the matching association is determined not to exist, the package is prevented from being further processed.

According to another embodiment of the present invention, a system is provided for physically verifying a correct association between information printed on a closed face package and material and/or information contained inside the closed face package. The system comprises a storage medium, an electronic processing apparatus, and one or more optical readers. The storage medium contains a data file which includes account information specific to a mail recipient. The electronic processing apparatus is adapted to access the data file and retrieve data forming a part of the account information. The optical reader is adapted to read data printed on a closed face package. The closed face package contains a document or other article, and includes a window through which the document is visible. The optical reader is further adapted to read document data printed on the document and visible through the window of the closed face package, and to send the package data and the document data to the electronic processing apparatus.

According to yet another embodiment of the present invention, a mailpiece processing system is provided comprising a mailpiece processing apparatus, a storage medium, an electronic processing apparatus, and one or more optical readers. The mailpiece processing apparatus includes a mail inserting device for inserting a document into a closed face package and a package printer for printing package data onto the closed face package. The storage medium contains a data file which includes account information specific to a mail recipient. The electronic processing apparatus is adapted to control operations of the mailpiece processing apparatus and to access the data file and retrieve data forming a part of the account information. The optical reader adapted to read data printed on the closed face package. The closed face package contains the document inserted by the mail inserting device and includes a window through which the document is visible. The optical reader is further adapted to read document data printed on the document and visible through the window of the closed face package, and to send the package data and the document data to the electronic processing apparatus.

According to a further embodiment of the present invention, a computer program product is adapted for physically verifying a correct association between information printed on a closed face package and material and/or information contained inside the closed face package. The closed face package includes a document inserted within the package, and the package has a window permitting a portion of the document to be read from a location outside of the package. The computer program product comprises computer-

executable instructions embodied in a computer-readable medium for performing steps comprising the following. Package data is received. The package data is printed on the closed face package and read from the package by a first reading device. Document data is also received. The document data is printed on the inserted document and appears through the window of the package. A data file is read to access account information stored therein corresponding to the document data. At least a portion of the accessed account information is compared with the package data to determine whether a matching association exists between the package data and the document data. If the matching association is determined to exist, the package is allowed to be further processed. If the matching association is determined not to exist, the package is prevented from being further processed.

It is therefore an object of the present invention to provide real time verification that information printed on a closed face package corresponds to materials and information disposed inside the closed face package.

Some of the objects of the invention having been stated hereinabove, other objects will become evident as the description proceeds when taken in connection with the accompanying drawings as best described hereinbelow.

Brief Description of the Drawings

Figure 1 is a schematic diagram of a mail processing system in which the present invention can be implemented;

Figure 2 is a schematic diagram of a mail inserting apparatus in which the present invention can be implemented;

Figure 3 is a flow diagram illustrating verification procedures carried out according to the present invention; and

Figures 4A and 4B are plan views of the front and rear faces, respectively, of an envelope utilized in accordance with the present invention.

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Detailed Description of the Invention

Referring now to Figure 1, a non-limiting example is illustrated of a document handling or mail processing system, generally designated **10**, in which the present invention can be implemented. In the present example, mail processing system **10** can be characterized as a closed loop solution which connects a host system or network **12** to the mailroom floor and provides custom processing information and real-time mailpiece tracking for each mailpiece. As used herein, the term "mailpiece" generally refers to an assembled, predetermined, inserted document or documents, together with any inserts. Typically, the operator of equipment included within mail processing systems such as mail processing system **10** can track and control the handling of individual mailpieces throughout the inserter operations through the use of a conventional job tracking system equipped with photocell devices or similarly functioning devices, thereby increasing mailing integrity to some degree. Missing or damaged mailpieces or elements thereof, as well as duplicates, can be automatically detected, and reprints can be generated accordingly. A manifest can be automatically generated that is based on the actual mail produced, and not just what was originally planned to be produced. Mail processing system **10** as exemplified herein preferably operates in conjunction with a data file containing the instructions for the handling of each mailpiece,

which data file typically is stored in a database residing on a database server
14. On-document barcode is thus minimized since all of the customer-specific
information can be stored in the database instead of having to be scanned off
the printed document. Additionally, inserts can be automatically and selectively
5 fed into a mailpiece if instructions for doing so are contained in the data file.
As is known by those skilled in the art, an "insert" ordinarily constitutes a single
paper or card that is to be included as a supplementary item in a mailpiece.

A typical architecture for mail processing system 10 includes a
supervisor computing device such as a supervisor PC 16, which provides a
10 central terminal for monitoring networked mail processing machinery and
serves as a gateway to database server 14. Supervisor PC 16 executes a
supervisor program which supports the loading and unloading of data files, pre-
and post-processing pull features, and the generation of combined reports as
well as reprint files. The supervisor program can also be used to manage
15 users, create job set-ups and corresponding materials, generate historical
reports and manifests, and perform database maintenance and site
configuration.

Also provided is mail insertion and processing equipment in the form of
an inserter, generally designated 20. Inserter 20 is the machine that physically
20 delivers sets of pre-printed sheets or documents from upstream devices and
adds selected inserts. Each document is then placed into an envelope. Each
envelope is sealed and sorted by predetermined characteristics configured on
supervisor PC 16. Database server 14 is provided to serve as the database
computer to provide and retrieve processing information for each mail

processing machine such as inserter **20**. Supervisor PC **16** is utilized to transfer data from the data file to and from database server **14**. For instance, job processing instructions can be set up at supervisor PC **16** and maintained on database server **14**, and then made available to inserter **20** which processes the job. A console **22** with its operative software applications serves as the user interface to inserter **20** via a machine control computer **24**. Operators of inserter **20** can use console **22** to run job setups created by the supervisor program on supervisor PC **16**. These jobs inform inserter **20** as to the layout of the document, the type of fold to use, the numbers corresponding to the insert hoppers which contain the inserts, what kind of addressing is needed, and how to handle the completed envelope. Operator, shift and job activity as well as operator and inserter efficiency on console **22** can be tracked by the supervisor program. Machine control computer **24** serves as the interface between console **22** and inserter **20**. The machine control is an embedded control system that directly controls the motors of inserter **20**. Typically, there is no operator interaction with machine control computer **24**. The various computers utilized in a mail processing system such as that described herein are networked to each other via cabling as needed.

Referring now to Figure 2, exemplary mail inserter **20** is illustrated in more detail. It should be noted that mail inserters in general can include a number of different types of components and stations known to those skilled in the art, depending on the types of mail processing jobs and operations contemplated. Figure 2 illustrates some examples. Accordingly, a front section **30** of inserter **20** includes components for implementing such operations as

loading, accumulating, folding and collating documents. A series of insert
hoppers **32** are included for adding inserts as demanded by the particular job
being run. During the creation of a data file, data relating to each insert and its
location in insert hoppers **32** are specified. A stuffing or inserting station **35**
5 includes an envelope hopper **37** and other components necessary for stuffing
or inserting the related set of documents and inserts into an envelope or other
type of mail package. An envelope printer **39** for ink jet addressing, for
example, is situated downstream of stuffing station **35**, as well as a special
handling station **41**, reject bin **43**, and a final destination conveyor **45**.
10 Envelope printer **39** is employed in cases where the envelope to be used does
not have a see-through window displaying the address.

Referring to Figure 3, a barcode or other control indication printed on a
control document of the document set is read off the control document in step
61, typically at a front end location of inserter **20**, and the corresponding
15 document identification data is extracted or retrieved from the database. The
data ordinarily include the final destination of the mailpiece and instructions as
to which inserts, if any, to include. These processing instructions are passed
on to inserter **20** in real time and the job is completed according to the mail-run
instructions contained in the data file. As described previously, in this manner,
20 the barcode need only contain the document ID and the rest of the mailpiece
data can be stored in the database. When the envelope is stuffed with the
appropriate documents and inserts and the stuffed envelope is transported to
envelope printer **39**, the system sends a data request signal to extract the
corresponding address data from the data file. The address data are sent to

envelope printer **39**, and envelope printer **39** is instructed to print the extracted address data onto the stuffed envelope when the envelope has been properly positioned under the print head. Similarly, if the data file contains other information that should be printed on the envelope, that information is printed as well.

As part of the job tracking capability of mail processing system **10**, envelope printer **39** can send a signal to machine control computer **24** to indicate that envelope printer **39** has printed the address data on the envelope. This signal can be sent in response to an inquiry made by the system software in step **63** in Figure 3. If envelope printer **39** indicates that it has printed an address, then machine control computer **24** permits the envelope to be further processed and mailed. If no signal is sent by envelope printer **39** indicating that address data has been printed at the point in time when envelope printer **39** is queried, then a step **65** is taken to ensure that this particular envelope is rejected and not mailed. This procedure, however, is not sufficient for obtaining a verification that the contents of the envelope actually match data printed on the envelope. As described hereinabove, the conventional manner for physically verifying mailpieces involves randomly pulling a stuffed envelope off-line and tearing the envelope open to manually determine whether the mailpiece comprising one or more documents and inserts matches information printed on the envelope by envelope printer **39**.

In accordance with the present invention, a complete physical verification is implemented by effecting an optical verification procedure at an optical verification site **47** disposed downstream of envelope printer **39** (see

Figure 2). Preferably, the optical verification procedure is controlled and executed by system software. One or more optical scanners or readers (not specifically shown), but preferably two readers, are operatively mounted at optical verification site **47**, and are adapted to read symbologies or characters sets such as those commonly known as Data Matrix, Data Glyph, Bar Code 39, OCR, Post Net barcode, Planet Code, Interleaved 2 of 5, and PDF 417. In one embodiment, the optical scanner is an OCR reader available from Cognex Corporation and designated as Model No. 8110. The optical verification procedure is carried out with the use of mail packages such as envelope illustrated in Figures 4A and 4B, generally designated **100**. Figure 4A illustrates a front face **102** of envelope **100**, and Figure 4B illustrates a rear face **104** of envelope **100**. On front face **102**, address data **106** has been sprayed by envelope printer **39** pursuant to instructions contained in the data file. In addition, package data **111** obtained from the data file, and in a symbological or characteristic format such as those delineated hereinabove, has also been sprayed onto front face **102** by envelope printer **39**. Rear face **104** of envelope **100** includes a window **113** which could be open or protected by a translucent layer such as a plastic film. A control document **115** forming a part of the mail articles comprising this particular mailpiece is visible through window **113**. Document data **117** specific to the data file for this mailpiece has been printed on control document **115**, again in a symbological or characteristic format such as those delineated hereinabove. The verification software associated with mail processing system **10** according to the present invention is configured such that document data **117** will be visible through window **113**.

That is, the articles to be included with the mailpiece are collated, folded and inserted such that control document **115** resides directly adjacent to the inside surface of rear face **104** of envelope **100**, and document data **117** is printed at a specific location on control document **115** according to the predetermined location of window **113**.

In the exemplary embodiment illustrated in Figures 4A and 4B, package data **111** has been printed on front face **102** of envelope **100** and window **113** of envelope **100** is disposed on rear face **104**. It will be understood, however, that package data **111** could be printed on either front face **102** or rear face **104** of envelope **100**, window **113** could be provided on either front face **102** or rear face **104**, and package data **111** and window **113** could be disposed either on the same face **102** or **104** of envelope or on opposing faces **102** and **104**. It will be further noted that the respective symbologies comprising package data **111** and document data **117** do not need to be the same. As a result, one of the optical readers provided in accordance with the present invention can be adapted to read one type of symbology while another optical reader provided can be adapted to read another type of symbology.

Referring back to Figure 3 with secondary reference being made to Figures 2, 4A and 4B, the verification process according to the present invention is broadly represented by steps **71-79**, and it will be understood that this process can be implemented with or without steps **61-65** described hereinabove. Address data **106** and package data **111** based on account information acquired in step **61** are sprayed on envelope **100** by envelope printer **39**. Assuming envelope **100** is to be further processed and not rejected

pursuant to step **65**, envelope **100** is carried forward to optical verification site **47**. At optical verification site **47**, the optical readers are activated in step **71**. The first optical reader reads package data **111** off either front face **102** or rear face **104** of envelope **100**, and the second optical reader reads document data **117** through window **113** (which is located on either front face **102** or rear face **104** of envelope **100**). The data read by the optical readers is sent to machine control **24**, where the software verifies in step **73** whether both package data **111** and document data **117** match corresponding account information contained in the targeted data file stored on database server **14**. If the match is verified, envelope **100** is allowed to be further processed in step **75**. If the match fails to be verified, an error message is displayed in step **77** at machine control console **22** and inserter **20** is rendered inoperable in step **79**. Further measures can also be taken in step **79**, such as the activation of an alarm or the automatic contacting of engineering personnel.

It should be noted that the orientation of the optical readers can be either "east-to-west" or "north-to-south", and that the orientation of each optical reader can be the same or different from that of the other. In the present example, package data **111** has been sprayed along an east-to-west line (see Figure 4A) and document data **117** appears along a north-to-south line, which requires that one of the optical readers operate along the east-to-west orientation while the other optical reader operate along the north-to-south orientation. Preferably, the optical readers are adjustably mounted or otherwise adapted to read in either the east-to-west or north-to-south directions as desired by the user. In this manner, the printing process itself does not

need to be modified from job to job. It is contemplated by the present invention that a single optical reader could be developed for reading both package data **111** and document data **117**, thus eliminating the need for providing more than one optical reader.

5 It thus can be seen that the present invention provides a novel solution for physically verifying on a real-time basis that the enclosed contents of a mail piece or other enclosure actually and correctly match the printed address or other information on the mail piece.

10 It will be understood that various details of the invention may be changed without departing from the scope of the invention. Furthermore, the foregoing description is for the purpose of illustration only, and not for the purpose of limitation—the invention being defined by the claims.